REMARKS

This Amendment is filed in response to the Office Action dated April 5, 2012, which has a shortened statutory period set to expire July 5, 2012.

Applicant responds to Examiner's Response to Arguments

Applicant appreciates the Examiner's clarification of the rejection of the claims. Specifically, as explained in the Office Action, the Examiner cites Fouche as disclosing a receiver that estimates and corrects carrier frequency offset and sampling frequency offset. The Examiner merely cites Frodigh as an OFDM communication system including a base station and mobile stations, thereby teaching bi-directional communication.

Applicant submits that the Examiner should further take into account what the estimation and correction of the carrier frequency offset and the sampling frequency offset in Fouche accomplishes. That is, the estimation and correction of the offsets in Fouche are performed to realign local oscillators in a receiver. Referring to FIG. 2, Fouche realigns the high frequency/intermediate frequency translation oscillator 213, the intermediate frequency/baseband frequency translation oscillator 222, and the sampling oscillator (not shown, but for sampling the ADC 23). Thus, Fouche realigns local oscillators only in a receiver.

As a result, the combination of Fouche with Frodigh teaches a base station and mobile stations, each of which can align its own local oscillators of its own receiver. Any modification of this configuration would be based on hindsight and not any teaching of these cited references.

In contrast, in Applicant's device and technique, the offset can be detected in a receiver of a transceiver, the

correction for which can then be quickly applied to a transmitter of the transceiver, thereby preemptively reducing the offset between the remote and central transceiver units. The combination of Fouche and Frodigh provides only an offset correction for oscillators in a receiver and therefore would not provide the preemptive offset reduction provided by Applicant's device and technique.

<u>Claims 1, 4, 15, 18, 34, and 35 are patentable over U.S. Patent 5,313,169 (Fouche) and U.S. Patent 5,726,978 (Frodigh).</u>

Claim 1 recites:

> means for detecting, responsive to a continuous comparison of received and detected signals in each of the remote transceiver units, a comparative offset between common frequency references used locally by the remote transceiver units and the common frequency used by the central transceiver unit in at least one first signal transmitted between the central and the remote transceiver units, wherein the common frequency reference is a carrier frequency in a first remote transceiver unit and a sampling frequency in a second remote transceiver unit;
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> means for adjusting the common frequency reference in each of the remote transceiver units in accordance with the offset in at least one second signal to be transmitted between the remote and central transceiver units to correct for an error in the common frequency reference, so that effects of the offset in each of the remote transceiver units will be substantially reduced in preemptive manner, the second signal being in substantial frequency lock with the common frequency.

Applicant respectfully submits that Fouche and Frodigh fail to disclose or suggest these limitations.

Fouche teaches re-aligning of local oscillators of a receiver to facilitate receiving a signal. Col. 1, lines 9-12. For example, Fouche computes values for carrying out the re-alignment of the frequency of the local oscillator 222 and a local sampling oscillator for sampling the ADC 23. Col. 10,

lines 33-37. Notably, the embodiments shown and described by Fouche pertain only to components of a receiver.

The Examiner admits that Fouche fails to teach (1) a plurality of remote transceiver units operable to communicate in continuous bi-directional manner for the direct exchange of information with a central transceiver unit disposed remotely therefrom using a common frequency, (2) the common frequency is a carrier frequency in a first remote transceiver unit and a sampling frequency in a second remote transceiver unit, and (3) at least one second signal to be transmitted between the central and remote transceiver units. The Examiner then cites Frodigh as an OFDM communication system including a base station and mobile stations, thereby teaching bi-directional communication.

Applicant respectfully submits that Frodigh fails to remedy the deficiencies of Fouche. Frodigh teaches that as communications take place, the signal quality level (C/I, carrier to interference ratio) of the sub-carriers within the subset of M subcarriers and the interference level (I) of all N available subcarriers are periodically measured. Col. 4, lines 56-59. These C/I and I measurement results are reported to a system. Col. 4, lines 59-60. In one embodiment, Frodigh teaches that a mobile station transmits only a limited set of measurement results to the system at certain select reporting intervals rather than all measurement results. Col. 5, lines 1-4. The transmitted limited set of measurement results comprises a select number of the lowest C/I measurement results and a select number of the lowest I measurement results. Col. 5, lines 4-7. The transmission of the limited set of results reduces the use of uplink system signaling resources. Col. 5, lines 7-9. As further taught by Frodigh, in col. 9, lines 16-37 (referring to FIGS. 3A and 3C):

> When a mobile station functions as link receiver, the processor 346 transfers the ACA data to the mobile station transmitter for transmission to the system over interface 362 which comprises the uplink on the appropriate control channel. In a base station as link receiver, the processor 346 transfers the ACA [adaptive channel allocation] data to the MSC over interface 362 which comprises landline or other connections. ACA processing portion 360 operates on the data and then returns appropriate subcarrier assignment commands to link receiver 330 over interface 364 which comprises landline or other connections when the base station is the link receiver, or the down link on the appropriate control channel when the mobile station is the link receiver. Processor 346 of link receiver 330 receives the commands and then generates the correct input parameters for the receiver so that the correct subcarriers for the link are received. ACA processing portion 360 also sends commands to MAP circuitry 304 associated with link transmitter 300 over interface 366. MAP circuitry 304 then maps the M symbols to the appropriate outputs of MAP circuitry 304 so that the correct subset of M subcarriers is transmitted on.

Thus, the C/I and I measurements are used to reconfigure the subset of M subcarriers to reduce co-channel interference on the link. Abstract. Indeed, the measurements used by Frodigh have nothing to do with frequency offset, much less an offset between a common frequency reference in each of the remote transceiver units and the common frequency used by the central transceiver unit.

As shown above, Fouche and Frodigh when combined fail to disclose or suggest the recited means for detecting and the recited means for adjusting. Therefore, Applicant requests reconsideration and withdrawal of the rejection of Claim 1.

Claim 4 depends from Claim 1 and therefore is patentable for at least the reasons presented for Claim 1. Based on those reasons, Applicant requests reconsideration and withdrawal of the rejection of Claim 4.

Claim 15 recites:

> detecting, responsive to a continuous comparison of received and detected signals in each of the remote transceiver units, a comparative offset between common frequency references used locally by the remote transceiver units and the common frequency used by the central transceiver units in at least a first signal transmitted between the central and the remote transceiver units, wherein the common frequency reference is a carrier frequency in a first remote transceiver unit and a sampling frequency in a second remote transceiver unit; and,
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> adjusting the common frequency reference in each of the remote transceiver units in accordance with the offsets in at least one second signal to be transmitted between the remote and the central transceiver units to correct for an error in the common frequency reference, so that effects of the offset in each of the remote transceiver units will be substantially reduced in preemptive manner, the second signal being in substantial frequency lock with the common frequency.

Therefore, Claim 15 is patentable for substantially the same reasons presented for Claim 1. Based on those reasons, Applicant requests reconsideration and withdrawal of the rejection of Claim 15.

Claim 18 depends from Claim 15 and therefore is patentable for at least the reasons presented for Claim 15. Based on those reasons, Applicant requests reconsideration and withdrawal of the rejection of Claim 18.

Claim 34 recites in part:

> means for detecting, responsive to a continuous comparison of received and detected signals in each of the remote transceiver units, a comparative offset between common frequency references used locally by said remote transceiver units and the common frequency used by the central transceiver unit in at least one first signal transmitted between the central and the remote transceiver units, wherein the common frequency reference is a carrier frequency in a first remote transceiver unit and a sampling frequency in a second

remote transceiver unit; ...

means for adjusting the common frequency references in the first and the second remote transceiver units in accordance with the offsets in at least one second signal to be transmitted between the first or second remote transceiver unit and the central transceiver unit to correct for errors in the common frequency reference~~s~~, so that effects of the offsets will be substantially reduced in preemptive manner, the second signal being in substantial frequency lock with the common frequency.

Therefore, Claim 34 is patentable for substantially the same reasons presented for Claim 1. Based on those reasons, Applicant requests reconsideration and withdrawal of the rejection of Claim 34.

Claim 35 recites in part:

means for detecting, responsive to a continuous comparison of received and detected signals in each of the remote transceiver units, a comparative offset between common frequency references used locally by the remote transceiver units and the common frequency used by the central transceiver unit in at least one first signal transmitted between the central and the remote transceiver units, wherein the common frequency reference is a carrier frequency in a first remote transceiver unit and a sampling frequency in a second remote transceiver unit; ...

means for adjusting the common frequency reference in each of the first and the second remote transceiver units in accordance with the offsets in at least one second signal to be transmitted ~~by~~ between the remote and the central transceiver units to correct for errors in the common frequency reference, so that effects of the offsets will be substantially reduced in preemptive manner, the second signal being in substantial frequency lock with the common frequency.

Therefore, Claim 35 is patentable for substantially the same reasons presented for Claim 1. Based on those reasons, Applicant requests reconsideration and withdrawal of the rejection of Claim 35.

<u>Claims 5, 8, 19, 22, and 29 are patentable over Fouche, Frodigh, and U.S. Patent 5,727,037 (Maneatis).</u>

Claims 5 and 8 depend from Claim 1 and therefore are patentable for at least the reasons presented for Claim 1. Maneatis fails to remedy the deficiency of Fouche and Frodigh with respect to Claim 1. Specifically, Maneatis fails to disclose or suggest the recited means for detecting and the recited means for adjusting. Based on all of the above reasons, Applicant requests reconsideration and withdrawal of the rejection of Claims 5 and 8.

Claims 19 and 22 depend from Claim 15 and therefore are patentable for at least the reasons presented for Claim 15. Maneatis fails to remedy the deficiency of Fouche and Frodigh with respect to Claim 15. Specifically, Maneatis fails to disclose or suggest the recited detecting and the recited adjusting. Based on all of the above reasons, Applicant requests reconsideration and withdrawal of the rejection of Claims 19 and 22.

Claim 29 recites:

> a frequency lock loop in a first remote transceiver unit and a delay lock loop in a second remote transceiver unit, the frequency and delay lock loops coupled to receive digital representations of at least one first signal transmitted by the central transceiver unit, the frequency and delay lock loops being respectively adapted to detect comparative carrier and sampling frequency offsets in the first signal and to produce offset information indicative of offsets between common frequency references locally used at the remote transceiver units and the common frequency used at the central transceiver unit; and
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> a frequency shift block in the first remote transceiver unit and a timing acquisition unit in the second remote transceiver unit, the frequency shift block and the timing acquisition unit coupled to receive the offset information and digital data to be transmitted and to each generate at least one second

signal to be received by the central transceiver unit, the frequency shift block and the timing acquisition unit being respectively adapted to digitally shift and sample the digital data in frequency in accordance with the common frequency references and the carrier and the sampling frequency offsets corresponding thereto to correct for errors in the common frequency references, so that effects of the carrier and the sampling frequency offsets will be substantially reduced in preemptive manner for continuous wireless bi-directional communication between the remote and the central transceiver units for the direct exchange of information.

Applicant respectfully submits that neither Fouche nor Frodigh disclose or suggest these limitations.

Fouche teaches re-aligning of local oscillators of a receiver to facilitate receiving a signal. Col. 1, lines 9-12. For example, Fouche teaches computing values for carrying out the re-alignment of the frequency of the local oscillator 222 and a local sampling oscillator for sampling the ADC 23. Col. 10, lines 33-37. Notably, the embodiments shown and described by Fouche pertain only to components of a receiver.

The Examiner admits that Fouche fails to teach (1) a plurality of remote transceiver units operable to communicate in continuous bi-directional manner for the direct exchange of information with a central transceiver unit, (2) the frequency lock loop in the first remote transceiver unit and the delay lock loop in the second remote transceiver unit, and (3) at least one second signal to be transmitted between the central and remote transceiver units. The Examiner then cites Frodigh as an OFDM communication system including a base station and mobile stations, thereby teaching bi-directional communication.

Applicant respectfully submits that Frodigh fails to remedy the deficiencies of Fouche. Frodigh teaches that as communications take place, the signal quality level (C/I, carrier to interference ratio) of the sub-carriers within the

subset of M subcarriers and the interference level (I) of all N available subcarriers are periodically measured. Col. 4, lines 56-59. These C/I and I measurement results are reported to a system. Col. 4, lines 59-60. In one embodiment, Frodigh teaches that a mobile station transmits only a limited set of measurement results to the system at certain select reporting intervals rather than all measurement results. Col. 5, lines 1-4. The transmitted limited set of measurement results comprises a select number of the lowest C/I measurement results and a select number of the lowest I measurement results. Col. 5, lines 4-7. The transmission of the limited set of results reduces the use of uplink system signaling resources. Col. 5, lines 7-9. As further taught by Frodigh, in col. 9, lines 16-37 (referring to FIGS. 3A and 3C):

> When a mobile station functions as link receiver, the processor 346 transfers the ACA data to the mobile station transmitter for transmission to the system over interface 362 which comprises the uplink on the appropriate control channel. In a base station as link receiver, the processor 346 transfers the ACA data to the MSC over interface 362 which comprises landline or other connections. ACA processing portion 360 operates on the data and then returns appropriate subcarrier assignment commands to link receiver 330 over interface 364 which comprises landline or other connections when the base station is the link receiver, or the down link on the appropriate control channel when the mobile station is the link receiver. Processor 346 of link receiver 330 receives the commands and then generates the correct input parameters for the receiver so that the correct subcarriers for the link are received. ACA processing portion 360 also sends commands to MAP circuitry 304 associated with link transmitter 300 over interface 366. MAP circuitry 304 then maps the M symbols to the appropriate outputs of MAP circuitry 304 so that the correct subset of M subcarriers is transmitted on.

Thus, the C/I and I measurements are used to reconfigure the subset of M subcarriers to reduce co-channel interference on

the link. Abstract. Indeed, the measurements used by Frodigh have nothing to do with frequency offset, much less an offset between a common frequency reference in each of the remote transceiver units and the common frequency used by the central transceiver unit.

Maneatis teaches a system and method for using self-biased circuits to reduce phase jitter and phase offset in phase locked loops and frequency. Abstract. The self-biased apparatus can be implemented as part of a multiple loop apparatus including a first loop to generate an output signal having a frequency that is substantially equal to an integral multiple N of the frequency of the input signal and a second loop, coupled to the first loop, to generate a second output signal from the first lop output signal, wherein the second output signal is substantially in phase with the input signal and has a frequency substantially equal to the integer multiple n of the frequency of the input signal. Abstract.

As shown above, Fouche, Frodigh, and Maneatis, even when combined, fail to disclose or suggest the recited elements in the first and second remote transceiver units. Therefore, Applicant requests reconsideration and withdrawal of the rejection of Claim 29.

<u>Claims 9, 23, and 31 are patentable over Fouche, Frodigh, Maneatis, and U.S. Patent 5,818,889 (Cook)</u>

Claim 9 depends from Claim 1 and therefore is patentable for at least the reasons presented for Claim 1. Maneatis and Cook fail to remedy the deficiencies of Fouche and Frodigh with respect to Claim 1. Specifically, Maneatis and Cook also fail to disclose or suggest the recited means for detecting and the recited means for adjusting. Therefore, Applicant requests reconsideration and withdrawal of the rejection of Claim 9.

Claim 23 depends from Claim 15 and therefore is patentable for at least the reasons presented for Claim 15. Maneatis and Cook fail to remedy the deficiency of Fouche and Frodigh with respect to Claim 15. Specifically, Maneatis and Cook also fail to disclose or suggest the recited detecting and the recited adjusting. Therefore, Applicant requests reconsideration and withdrawal of the rejection of Claim 23.

Claim 31 recites in part:

> a frequency lock loop in a first remote transceiver unit and a delay lock loop in a second remote transceiver unit, the frequency and delay lock loops coupled to receive digital representations of at least one first signal transmitted by the central transceiver unit, the frequency and delay lock loops being respectively adapted to detect comparative carrier and sampling frequency offsets in the first signal and to produce analog offset signals indicative of offsets between common frequency references locally used at the remote transceiver units and the common frequency used at the central transceiver unit; ...
>
> variably adjustable device coupled to receive the offset signals, the variably adjustable device being respectively adapted to adjust the reference frequency of the crystal oscillator and a sampling clock of an analog-to-digital converter in accordance with the offset signals to correct for errors in the common frequency references, so that effects of the carrier and the sampling frequency offsets in the second signal to be perceived by the central transceiver unit will be substantially reduced in preemptive manner for continuous wireless bi-directional communication between the remote and the central transceiver units for direct exchange of information.

Applicant respectfully submits that Fouche and Frodigh when combined fail to disclose or suggest these limitations.

Fouche teaches re-aligning of local oscillators of a receiver to facilitate receiving a signal. Col. 1, lines 9-12. For example, Fouche teaches computing values for carrying out the re-alignment of the frequency of the local oscillator 222

and a local sampling oscillator for sampling the ADC 23. Col. 10, lines 33-37. Notably, the embodiments shown and described by Fouche pertain only to components of a receiver.

The Examiner admits that Fouche fails to teach (1) a plurality of remote transceiver units operable to communicate in continuous bi-directional manner for the direct exchange of information with a central transceiver unit disposed remotely therefrom using a common frequency, (2) a frequency lock loop in the first remote transceiver and a delay lock loop in the second remote transceiver, and (3) at least one second signal. The Examiner then cites Frodigh as an OFDM communication system including a base station and mobile stations, thereby teaching bi-directional communication.

Applicant respectfully submits that Frodigh fails to remedy the deficiencies of Fouche. Frodigh teaches that as communications take place, the signal quality level (C/I, carrier to interference ratio) of the sub-carriers within the subset of M subcarriers and the interference level (I) of all N available subcarriers are periodically measured. Col. 4, lines 56-59. These C/I and I measurement results are reported to a system. Col. 4, lines 59-60. In one embodiment, Frodigh teaches that a mobile station transmits only a limited set of measurement results to the system at certain select reporting intervals rather than all measurement results. Col. 5, lines 1-4. The transmitted limited set of measurement results comprises a select number of the lowest C/I measurement results and a select number of the lowest I measurement results. Col. 5, lines 4-7. The transmission of the limited set of results reduces the use of uplink system signaling resources. Col. 5, lines 7-9. As further taught by Frodigh, in col. 9, lines 16-37 (referring to FIGS. 3A and 3C):

When a mobile station functions as link receiver, the processor 346 transfers the ACA data to the mobile station transmitter for transmission to the system over interface 362 which comprises the uplink on the appropriate control channel. In a base station as link receiver, the processor 346 transfers the ACA data to the MSC over interface 362 which comprises landline or other connections. ACA processing portion 360 operates on the data and then returns appropriate subcarrier assignment commands to link receiver 330 over interface 364 which comprises landline or other connections when the base station is the link receiver, or the down link on the appropriate control channel when the mobile station is the link receiver. Processor 346 of link receiver 330 receives the commands and then generates the correct input parameters for the receiver so that the correct subcarriers for the link are received. ACA processing portion 360 also sends commands to MAP circuitry 304 associated with link transmitter 300 over interface 366. MAP circuitry 304 then maps the M symbols to the appropriate outputs of MAP circuitry 304 so that the correct subset of M subcarriers is transmitted on.

Thus, the C/I and I measurements are used to reconfigure the subset of M subcarriers to reduce co-channel interference on the link. Abstract. Indeed, the measurements used by Frodigh have nothing to do with frequency offset, much less an offset between a common frequency reference in each of the remote transceiver units and the common frequency used by the central transceiver unit.

Maneatis teaches a system and method for using self-biased circuits to reduce phase jitter and phase offset in phase locked loops and frequency. Abstract. The self-biased apparatus can be implemented as part of a multiple loop apparatus including a first loop to generate an output signal having a frequency that is substantially equal to an integral multiple N of the frequency of the input signal and a second loop, coupled to the first loop, to generate a second output signal from the first lop output signal, wherein the second output signal is

substantially in phase with the input signal and has a frequency substantially equal to the integer multiple n of the frequency of the input signal. Abstract.

Cook teaches a phase shifting system including means for receiving a reference clock signal having a predetermined phase, means for manipulating the reference clock to generate at least one multi-level waveform derived therefrom, and means for selecting desired levels from the multi-level waveform to provide an output signal of desired phase. Col. 2, lines 19-25.

As shown above, Fouche, Frodigh, Maneatis, and Cook, even when combined, fail to disclose or suggest multiple recited elements of Claim 31. Therefore, Applicant requests reconsideration and withdrawal of the rejection of Claim 31.

CONCLUSION

Claims 1, 4, 5, 8, 9, 15, 18, 19, 22, 23, 29, 31, 34, and 35 are pending in the present application. Allowance of these claims is respectfully requested.

If there are any questions, please telephone the undersigned at 408-451-5907 to expedite prosecution of this case.

Respectfully submitted,

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